

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

- Claim 1. (canceled).
2. (Previously Presented) The liquid jetting apparatus as set forth in claim 22, wherein a potential difference of the first expanding element is equal to the potential difference of the drive signal.
3. (Previously Presented) The liquid jetting apparatus as set forth in claim 22, wherein the potential difference of the first contracting element is not greater than 50% of the potential the drive signal; and
wherein a potential difference of the second expanding element is not less than 40% of the potential difference of the drive signal.
4. (Original) The liquid jetting apparatus as set forth in claim 3, wherein the potential difference of the second expanding element is not greater than the potential difference of the first contracting element.
5. (Previously Presented) The liquid jetting apparatus as set forth in claim 22, wherein the second expanding element is supplied for a time period which is not greater than one quarter the natural vibration period of the pressure chamber.

6. (Previously Presented) The liquid jetting apparatus as set forth in claim 22, wherein a gradient of the second expanding element is greater than a gradient of the first contracting element.

Claims 7 and 8. (canceled).

9. (Previously Presented) The liquid jetting apparatus as set forth in claim 22, wherein a potential difference of the second contracting element is not less than 75% of the potential difference of the drive signal.

Claims 10-12. (canceled).

13. (Previously Presented) The liquid jetting apparatus as set forth in claim 22, wherein the drive pulse includes: a damping hold element, which holds a termination end potential of the second contracting element for a predetermined time period; and

a damping element, supplied after the damping holding element to drive the pressure generating element so as to expand the pressure chamber to a reference volume thereof.

14. (Original) The liquid jetting apparatus as set forth in claim 13, wherein the damping element is supplied for a time period which is not greater than a half the natural vibration period of the pressure chamber.

15. (Original) The liquid jetting apparatus as set forth in claim 13, wherein a time period from a start end of the first contacting element to a start end of the damping element is not greater than the natural vibration period of the pressure chamber.

16. (Previously Presented) The liquid jetting apparatus as set forth in claim 22, wherein the drive pulse includes a preliminary contracting element, which drives the pressure generating element so as to contract the pressure chamber from a reference volume thereof, before the first expanding element is supplied.

17. (currently amended): A method of driving a liquid jetting apparatus provided with a liquid jetting head which includes a nozzle orifice, a pressure chamber communicated with the nozzle orifice, and a pressure generating element, the method comprising the steps of:

a first expanding step, for driving the pressure generating element so as to expand the pressure chamber, so that a meniscus of liquid in the nozzle orifice is polled toward the pressure chamber as much as possible;

a first contracting step, for driving the pressure generating element so as to contract the pressure chamber expanded by the first expanding step, so that a center portion of the meniscus is swelled in an ejecting direction of a liquid drop;

a second expanding step, for driving the pressure generating element so as to expand the pressure chamber contracted by the first contracting step, so that a marginal portion of the swelled center portion of the meniscus is pulled toward the pressure chamber; and

a second contracting step, for driving the pressure generating element so as to contract the pressure chamber expanded by the second expanding step, so that the meniscus is again urged in the ejecting direction to increase jetting speed of a satellite liquid drop which follows a main liquid drop,

wherein a contracted amount of the pressure chamber in the second contracting step is larger than at least one of a contracted amount of the pressure chamber in the first contracting step and an expanded amount of the pressure chamber in the second expanding step; and

wherein the contracted amount of the pressure chamber in the second contracting step is ~~not larger~~ less than an expanded amount of the pressure chamber in the first expanding step.

18. (Original) The driving method as set forth in claim 17, wherein the first expanding step is performed for a time period which is not greater than a half a natural vibration period of the pressure chamber.

19. (Original) The driving method as set forth in claim 17, wherein the second contracting step is performed for a time period which is not greater than one third of a natural vibration period of the pressure chamber.

20. (Original) The driving method as set forth in claim 17, wherein a time period between a time at which the first contracting step is started and a time at which the second contracting step is started is not greater than a natural vibration period of the pressure chamber.

21. (Original) The driving method as set forth in claim 20, wherein the time period between the start timings of the first contracting step and the second contracting step falls within a range of one quarter to one third the natural vibration period of the pressure chamber

22. (currently amended): A liquid jetting apparatus, comprising:
a liquid jetting head, including a nozzle orifice, a pressure chamber
communicated with the nozzle orifice, and a pressure generating element which varies, the
volume of the pressure chamber; and
a drive signal generator, which generates a drive signal including a drive pulse,
supplied to the pressure generating element, the drive pulse including:
a first expanding element, which drives the pressure generating element so as to
expand the pressure chamber, so that a meniscus of liquid in the nozzle orifice is pulled toward
the pressure chamber as much as possible;

a first contracting element, which drives the pressure generating element so as to contract the pressure chamber expanded by the first expanding element, so that a center portion of the meniscus is swelled in an ejecting direction of a liquid drop;

a second expanding element, which drives the pressure generating element so as to expand the pressure chamber contracted by the first contracting element, so that a marginal portion of the swelled center portion of the meniscus is pulled toward the pressure chamber; and

a second contracting element, which drives the pressure generating element so as to contract the pressure chamber expanded by the second expanding element, so that the meniscus is again urged in the ejecting direction to increase jetting speed of a satellite liquid drop which follows a main liquid drops,

wherein a contracted amount of the pressure chamber established by the second contracting element is larger than at least one of a contracted amount....of the pressure chamber established by the first contracting element and an expanded amount of the pressure chamber established by the second expanding element; and

wherein the contracted amount of the pressure chamber established by the second contracting element is ~~not larger~~ less than an expanded amount of the pressure chamber established by the first expanding element.

23. (Previously Presented) The liquid jetting apparatus as set forth in claim 22, wherein the first expanding element is supplied for a time period which is not greater than a half a natural vibration period of the pressure chamber.

24. (Previously Presented) The liquid jetting apparatus as set forth in claim 22, wherein the second contracting element is supplied for a time period which is not greater than one third of a natural vibration period of the pressure chamber.

25. (Previously Presented) The liquid jetting apparatus as set forth in claim 22, wherein a time period between an initial end of the first contracting element and an initial end of the second contracting element is not greater than a natural vibration period of the pressure chamber.

26. (Previously Presented) The liquid jetting apparatus as set forth in claim 25, wherein the time period between the initial ends of the first contracting element and the second contracting element falls within a range of one quarter to one third the natural vibration period of the pressure chamber.